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Monte-Carlo simulation for elastic energy loss of high-energy partons in a hydrodynamical background

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We examine the significance of elastic collisions as the suppression mechanism of high-energy partons in the strongly interacting medium formed in ultrarelativistic heavy ion collisions. For this purpose, we have developed a Monte Carlo simulation describing the interactions of perturbatively produced, non-eikonally propagating high-energy partons with the quarks and gluons from the expanding QCD medium. The partonic collision rates are computed in leading-order perturbative QCD, while three different hydrodynamical scenarios are used to model the QCD medium: (1+1)-dimensional hydro with initial conditions from the EKRT model for central heavy ion collisions, (2+1)-dimensional hydro with a smooth sWN profile obtained from the optical Glauber model for non-central collisions, and event-by-event hydro with an eBC profile from the Monte Carlo Glauber model to study the initial state fluctuation effects.

We compare our results with the neutral pion suppression observed in sqrt(s_NN)=200 GeV Au+Au collisions at the BNL-RHIC. We find the incoherent nature of elastic energy loss incompatible with the measured data. Also the effect of the initial state fluctuations appears to be negligible.

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